Fundamentals of Artificial Intelligence [H02C1a]

Xinhai Zou (r0727971)

Contents

1 Descriptive Statistics

2 Visualizing data

3 Important Distributions

4 Confidence Intervals

4.1 Courses

4.1.1 Calculation both lcl and ucl

```
# calculating both lcl and ucl
zsum.text(mean.x=101.4, sigma.x=8, n.x=4, conf.level=0.99)

## Results
## One-sample z-Test

## data: Summarized x
## z = 25.35, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 99 percent confidence interval:
##    91.09668 111.70332
## sample estimates:
## mean of x
##    101.4
```

4.2 Exersice

5 Hypothesis Testing

5.1 Courses

5.1.1 Comparison of two expected value by t-test

1. first calculating normality
2. then test equality of variability
3. if same ← use var.equal=TRUE
4. if not same ← use var.equal=FALSE

5.2 Exersice

6 Correlation

6.1 Courses

6.1.1 Pairs diagram, good looking

```
# Pairs diagram
annual <- temperature$annual
lat <- temperature$Latitude latitude
long <- temperature$Longitude
combine <- data.frame(annual, lat, long) pairs(combine)
```

6.2 Exersice

7 Linear Regression

7.1 Courses

7.1.1 Asymptote

```
# Asymptote
abline(res.lm1)
# first: slope, second: intercept
abline(a=0,b=1)
```

7.2 Exersice

8 Selection of Variables

9 Analysis of Variance (ANOVA)

9.1 Courses

9.1.1 ¨lmdifferent from äov

There is a transformation between lm and aov

```
# Using aov, (need to change df to as.factor)
diet.aov1 <- aov(LOSS ~ JOGGING + DIET + JOGGING*DIET
    data=diet_df,contrasts=list(JOGGING='contr.sum',DIET='contr.sum'))
summary(diet.aov1)
```

```r
# Using lm, (do not need to as.factor)
diet.lm <- lm(LOSS ~ JOGGING + DIET + JOGGING * DIET,
    data=diet_df,contrasts=list(JOGGING="contr.sum",DIET="contr.sum"))

# Using ANOVA table, since ANOVA can be seen as a linear model, we
    can also use the lm function in R.
Anova(diet.lm,type='III')
```

9.1.2 unhomogeneous variance

```r
# Robust analysis, using hc3
Anova(diet.aov2,type="III",white.adjust='hc3')
```

9.2 Exersice

10 Logistic Rgression

10.1 Courses

10.1.1 Reference

Gender $= 0$ is reference, $0.15 \rightarrow$ male : female $= 0.15$, so female : male ≈ 6.67

10.1.2 Import ẋlsx file

```r
# import .xlsx file
political_party = read.table(file=file.choose(),header=TRUE,sep=',')
```

10.1.3 μ-Comparison using ANOVA!

10.2 Exersice

11 Introduction to Poisson Regression

12 Generalized Linear Model

13 DSM: Principal Component Analysis

14 DSM: Clustering Analysis